coincidentally correspond to the curvature * * * [of cyclone paths referred to previously.] * * * I had nine years study of it [in looking over the logs of eastward-bound vessels].

These "dumb-bell winters" are very provoking to the agriculturist on account of the mock spring they cause. People sow accordingly, and just about the time the plants are above the ground (late September or the first week of October) about eight weeks or two months wintry weather sets in, causing no end of trouble. Our politicians gape aghast when they see the cost of observing and recording "effects" (the money expended in trying to get at the cause or causes is infinitesimal) and as a consequence they have the Meteorological Department "set" as "useless," "farcical," "waste of money," etc.

Every year the wind vane at Cape Leeuwin lighthouse tells the Australian world its part of the story with the greatest reliability, but year after year it passes unheeded, not understood, etc. We here, on this bit of land, 40 by 16 [miles], take no interest in statistics of the past. However, is nothing deducible from those statistics? If not, where does the value come in?

What is needed in Australia is a solar observatory, and some of the thousands of pounds sterling that are spent annually in the compilation of data could be devoted with far greater benefit to the Australian people to such an observatory, for it is mainly by the existence or otherwise of the curvature I refer to that so many millions of Australian money are affected.

It seems absurd to think that the Government meteorologist in Melbourne can not inform the people early in June of such curvature when the masters of vessels tell him that their vessel emerged from a dense wall or mountain of coarse weather near St. Pauls and steamed for 8 to 10 days through an easterly gale in comparatively clear weather—what is that but the plainest evidence of the curvature of the usual belt northward—for the same masters visit King Island and they will find the same or similar conditions recorded? * * * In years to come perhaps some one will succeed in getting at the cause of the variation [icebergs, solar variations?] and thus render a great service to thousands of helpless beings who are from time to time ruined by the effects of drought and broken winters too.—*C. Richardson.*

THE MARINE OBSERVER'S HANDBOOK.[1]

(Abstract.)

The second edition of The Marine Observer's Handbook, the standard work on marine meteorology, follows closely the lines of the first edition, issued in 1915. There is a foreword by Sir Napier Shaw, until recently director of the meteorological office, and a brief history of the office. Part I of the handbook is devoted to a description of the instruments and methods of observation required for keeping the meteorological record, or log. Part II deals with observations of wind, sea disturbance, clouds, weather and optical phenomena, including a comprehensive treatment of the subject of waves and swell. Part III comprises instructions for keeping the meteorological records. In the appendix are illustrations of cloud forms, with a graphic guide to their recognition, meteorological tables, instructions for transmitting weather reports from ships at sea by radio telegraphy, and

a list of publications, for the most part issued by the Meteorological Committee and its predecessors.—*F. G. Tingley.*

DEFINITIONS OF "MEAN," "AVERAGE," AND "NORMAL."

(Dictionary definitions and contributions from C. F. Marvin, A. J. Henry, H. C. Frankenfield, C. F. Talman, J. Warren Smith, P. C. Day, and Cl. Abbe, jr.)

Compiled by C. F. BROOKS.

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Dictionaries make little or no distinction between the meanings of the three terms *mean, average,* and *normal;* yet in meteorological usage, *normal* has a meaning fairly distinct from *mean* or *average.* Let us consider prevailing definitions of each term; and attempt to arrive at some generalities which should govern the use of each in meteorological statistics.

MEAN.

In Webster's Dictionary [1] we find: "*Mean.* a. 4. *Math.* Average; having an intermediate value between two extremes, or between the several successive values of a variable quantity during one cycle of variation, such that were they all equal, the mean would be their common value. * * * [As a noun]. Usually, unless otherwise specified, it is the one simple average (called arithmetical mean) formed by adding the quantities together in any order and dividing by their number." A more detailed discussion is to be found in the Century Dictionary and Cyclopedia (New York, 1911).

AVERAGE.

From Webster's Dictionary we have the following definition: "*Average.* n. 5. A mean proportion, medial sum, or quantity, made out of unequal sums or quantities; an arithmetical mean." Murray's Dictionary [2] says that an *average* is the distribution of the aggregate inequalities of a series of things among all members of the series, so as to equalize them and ascertain their common, or mean, quantity, etc., when so treated; the determination or statement of an arithmetical mean; a medial estimate. The Century Dictionary gives: "*Average* II a. 1. Equal in amount to the sum of all the particular quantities of the same sort divided by the number of them; as the average yield of wheat to the acre; the average price of anything for a year; hence 2. of medium character, quality, etc.; midway between extremes; ordinary."

AVERAGE AS DISTINGUISHED FROM MEAN.

Marriott in "Hints to Meteorological Observers" (6th ed., 1906) says that the arithmetical average or mean is the sum of all values forming the series of figures under consideration, divided by their number; and that *average* is the term used for results extending over a long period, while *mean* is used for short periods, e. g., a day, month, or year. Thus we might speak of the *mean* temperature of December, 1918, but of the *average* December temperature during the period, 1899–1918.

Dr. H. R. Mill, director of the British Rainfall organization, says (M. W. R., January, 1915, 43:42): "For convenience I use the term *mean* as indicating the sum of any

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